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ABSTRACT

This case study is an interpretation of the honesty of a student in a high school physics classroom, and is part of a dissertation designed to investigate student roles and goals based on gender, ethics, and learning. In this paper on ethics, the actions of the physics student are examined as issues which link to the student's classroom roles and goals. The honesty of the student is questioned by the researcher as other students help her solve textbook problems and a student says the value of 'G' aloud which helps her answer a question while a test is being administered. However, the student does not consider her actions as dishonest and can justify them. It is concluded that the reporting of grades distorts the student's educational goals, which causes a conflict between the ethical issues of honesty and caring. As a caring person, the student maintains that cheating is justified in the context of the physics classroom. Contains 33 references. (Author)

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AN INTERPRETATION OF ONE STUDENT'S CHEATING IN A HIGH SCHOOL PHYSICS CLASSROOM: A CASE STUDY

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Abstract

This case study is an interpretion of the honesty of a student in a high school physics classroom. The research is part of a dissertation designed to investigate student roles and goals based on gender, ethics, and learning. The following questions frame the research: (1) To what degree is the student honest in her completion of textbook assignments and tests? (2) How do the teacher's actions relate to the student's honesty in completing assignments? and (3) What are the connections between the student's honesty and her classroom goals? In this paper on ethics, the actions of the physics student are examined as issues which link to the student's classroom roles and goals. Her classroom actions are interpreted in light of Hugh Sockett's framework of ethics outlined in *The Moral Base For Teacher Professionalism* (1993). Sockett defines honesty, courage, care, fairness, and practical wisdom as the five major virtues of the moral profession of teaching. Honesty and care are analyzed in this study. According to Sockett, "few would dispute the need for honesty in social life generally. It seems difficult to imagine how a society could cohere if, as a general rule, people did not tell the truth" (1993, p. 63). The honesty of the physics student is questioned by the researcher as other students help her solve textbook problems and a student says the value of 'G' aloud which helps her answer a question while a test is being administered. However, the student does not consider her actions as dishonest because: (1) all of the students could hear the value of 'G'; (2) she doesn't believe the teacher has adequately prepared her for the test; and (3) her goal of obtaining a good grade justifies her actions. The reporting of grades distorts the student's educational goals which causes a conflict between the ethical issues of honesty and caring. As a caring person, the student maintains that cheating is justified in the context of the physics classroom.

Purpose

The purpose of this paper is to join in the "search for moral standards and for best practice which is at the heart of professionalism in teaching" (Sockett, 1993, p. 1). To begin the search, it is necessary to affirm that teaching is a moral activity; even though "the moral dimensions of teaching have often been ignored or forgotten in the past" (Fenstermacher, 1990, p. 133). "Teaching is a moral enterprise because it is a social enterprise" (Thomas, 1990, p. 267). More specifically "what makes teaching a moral endeavor is that it is, quite centrally, human action undertaken in regard to other human beings. Thus matters of what is fair, right, just, and virtuous are always present" (Fenstermacher, 1990, p. 133).

Ethical issues of rightness, fairness, and equity are fundamental to understanding the behaviors, attitudes, and knowledge of instructors who engage in teaching and students who engage in learning high school physics. Fenstermacher (1990) adds:

> Just as teachers possess a manner that defines the moral character of their teaching, so learners have a manner that identifies their moral development. The manner of the learner is within and without school; while within school, it is encouraged through engagement with the teacher and the subject matter. (p. 135)

Interpretations of the ethical issues relating to the actions of the physics classroom participants facilitate the search for professional teaching standards and practices (Sockett 1990, 1993; Soder, 1990; Dewey, 1916; Fenstermacher, 1990; Thomas, 1990; Sirotnick, 1990).

Research Methods

In this study, classroom observation notes, student interviews, student narratives, and classroom documents contributed to the descriptive field text. Observation notes were taken during 52 one hour and fifty minute class periods. The class met for a total of 12 weeks in a school in the deep south. In total, the researcher observed and participated in 95 hours of classroom instruction. Observation notes focused on both student and teacher actions and interactions in the classroom. The teacher and the students were of Caucasian ethnicity. All of the students were in grade 12. Two girls and eight boys attended the physics class. Participation consisted of tutoring students and answering individual questions as students worked independently to solve textbook problems at their desks. The course textbook, course syllabi, student contracts, tests, project rules, science safety rules, and class assignments provided additional sources of data. These documents constructed the formal curriculum, assessments, classroom procedures, and rules that outlined the expected student behaviors and learning outcomes.

Sally is the name given to the participating college-bound senior who took part in interviews. In this study, pseudonyms were used in place of real names of persons and places to

ensure confidentiality (Soltis, 1989; Tobin, 1992). Sally shared a student table with another student called Frank. She described her classroom experiences through both oral and written text. She was contracted at a rate of $5 per hour for taking part in 18 hours of audio-recorded semi-structured interviews. During the interviews, Sally's prior mathematics and science classroom learning environments were contrasted with the physics classroom. Sally wrote a narrative about her ideal physics learning environment and her willingness to be forthcoming and candid during the interviews. The interviews established an ethic of care that solidified the creation of the stories of Sally (Brickhouse, 1992). For example, she negotiated what would be told in the stories and to maintain rapport with Sally, interview transcripts were not shared with the physics teacher. Although the teacher was invited to comment on the stories after the school term had been completed no comments have been received to date.

The field text was categorized into thematic patterns with the aid of the qualitative software program: NUD•IST (*Non-numerical Unstructured Data Indexing Searching and Theorizing*, 1993). Thematic patterns evolved from an examination of the connections among categories in the NUD•IST outline of the salient issues. Next, thematic patterns formulated storylines. Descriptive stories evolved from the storylines. Sally read the evolving stories, and she provided authenticity and credibility checks throughout the creation of the categories, thematic patterns, storylines, and stories (Guba & Lincoln, 1989).

Story Narratives

Story narratives describe students knowledge of physics in the context of their experienced classroom learning environment. In this study, "[n]arrative is both a mode of reasoning and a mode of representation" (Richardson, 1990, p. 21). The participating students' behavior, attitudes, and knowledge are represented in the student stories. The sense these students make of their classroom experience comes about through a narrative mode of reasoning. Educational researchers have utilized narrative as both a form of storytelling and a form of inquiry (Martin & Brouwer, 1993, 1991; Pope & Gilbert, 1983; Clandinin, Davies, Hogan, & Kennard, 1993; Clandinin & Connelly, 1994, 1991; Mattingly, 1991; Ellis, 1994). Clandinin and Connelly suggest that "stories are the closest we can come to experience as we and others tell of our experience" (1994, p. 415).

Stories of the subject of this study, Sally, are reviewed and critiqued by her to ensure authentic and credible representations of her experiences. Sally's classroom experiences are presented as stories to describe the learning environment from her point of view. Such stories are not merely a means of reporting data; they also promote an understanding of another person's experience through verisimilitude, that is the sense or quality of truth. Although a teacher or researcher cannot experience the classroom learning environment directly as a

student, a narrative inquiry may enable the reader to experience verisimilitude and thereby connect with the student's experiences.

The two stories about Sally focus on her interactions with the physics teacher, Mr. Benson. The first story, *Classroom Dilemma*, portrays Sally's actions during a test, and the second story, *Fear of Being Revealed*, illustrates her actions during in-class problem solving activities. These stories follow.

Classroom Dilemma

At the end of the unit on velocity, acceleration, and gravity, Mr. Benson gave the students a test. The eight page test had multiple choice concept questions and 15 word problems from three textbook chapters covering vectors, motion in two dimensions, and universal gravitation. Each physics student could use a calculator and an equation card while solving the test questions. On their 3 x 5 inch index equation cards, the students listed formulae and variables from the three chapters.

Thirty minutes into the test, Sally looked at her equation card for the gravitational constant used in Newton's Law of Gravitation. She needed this constant to plug into the equation: $F = \frac{G(m_1 m_2)}{d^2}$ to solve a test item. The question was: "Two balls each have a mass of 5.0 kilograms. They are located 39 centimeters apart. What gravitational force do they exert on each other?" She examined the front and back of her equation card which was crammed with symbols and formulae, but she couldn't find the value for 'G.' She must have forgotten to list 'G' on the card, so she went on to another test item.

Twenty minutes later, Mr. Benson's office phone rang, and he walked through the doorway leading into his adjacent office. Just as Mr. Benson left the room, a student from the front of the classroom asked if anyone knew the value for 'G.' Everyone could hear his whispered request. Many of the students turned and looked for Mr. Benson at the doorway leading into his office. He was not there. No one said anything at first. Then a student in the front of the room stated $G = 6.67 \times 10^{-11}\left(\frac{Nm^2}{kg^2}\right)$. Sally could not help but hear the value from where she sat at the back of the room. Like a number of other students in the class, she wrote the value down as the student from the front of the room repeated it.

Sally did not like copying the value down onto her paper during the test. In fact, cheating even to this slight degree gave her a twinge of guilt. Yet when the constant was spoken aloud before the entire class, she figured she was justified in using it since this did not give her an unfair advantage over other students. Faced with the prospect of missing the test question and lowering her already poor physics grade, Sally figured it was "OK" to use the value in spite of

Mr. Benson's rule that prohibited cheating. The importance of earning a decent test grade outweighed the potentially harmful effects of having Mr. Benson discover that she had copied the 'G' constant during the test.

Sally looked on her card and found that 'N' represented a Newton which was a unit for force. Sally did not know how this unit connected with the concept of force, but she knew that the final answer would have the 'N' unit. Sally knew that 'm' represented a meter and 'kg' represented a kilogram.

On a multiple choice concept problem Sally had to decide whether gravitational force was strong or weak. She recalled reading in the textbook that gravity was a very weak force. That must have been why 'G' was such an extremely small number--$6.67 x10^{-11}$. Just because Sally had read that gravity was a weak force didn't mean that she really had understood it. She figured that it must take a large force to keep the moon in orbit about the earth, but this idea did not make sense with what she remembered from the textbook. Sally accepted the textbook definition even though she had doubts about the strength of the gravitational force.

After a couple of minutes had past, Mr. Benson returned to the room. Sally's thoughts snapped back to the test and she read the next test question. She was confident that Mr. Benson would not discover that she had obtained the value of 'G' from another student. The twinge of guilt from using the value of 'G' quickly faded as she continued answering test questions.

Fear Of Being Revealed

It had taken considerable effort on Sally's part to enroll in physics at the beginning of the trimester. She wanted to sign up for the course because the high school guidance counselor recommended it. She was told that enrolling in the physics class would improve her chances of being admitted to a college of her choice. Sally was the only student in the class who had not taken trigonometry which was considered a prerequisite. The physics teacher, Mr. Benson, was reluctant to allow her to enroll; however, Sally and her parents convinced the teacher to admit her into the course.

With only 10 minutes remaining in the one hour and fifty minute class period, Sally sat motionless. Her hazel eyes followed the thin red second hand as it rotated around the face of the classroom clock. She sat at the desk with her hands resting on a maroon Jansport book bag and she waited for the final minutes of the class period to end. Anticipating the dismissal bell had become routine for Sally, but it hadn't always been this way.

As the minute hand on the classroom clock climbed slowly toward the top of the hour, Sally drew a breath of relief that Mr. Benson had not discovered her lack of understanding of mechanics. Then she reflected on what had transpired during this class period.

This period had been a typical day in the physics class. For example, very little direct instruction had been initiated by the teacher. Laboratory activities and demonstrations were not often conducted. Mr. Benson asked the students to complete the homework assignment from the previous day. The students then opened their textbooks and began to solve problems individually or with a student partner. Mr. Benson encouraged students to work together. Sally and the other students sat at their desks in a "work at your own pace" classroom environment for much of the period.

During the first hour, the room had been about as quiet as a library during finals week. Hushed voices could be heard as Joe and Chevy discussed some humorous incident from school or the results of a recent basketball game. Yet, the smooth humming sound of the clock filled the room. Most of the students completed their physics assignment, worked on homework from other classes, and quietly socialized with their neighbors.

Sally gave up on the assignment some 25 minutes after the tardy bell had sounded, and her physics textbook lay opened before her on her desk. She did not understood what the physics concepts meant. She didn't understand vectors, nor did she know how to add and subtract vectors. Reading the textbook and memorizing formulae like $a = \frac{\Delta v}{\Delta t}$ did little to help her understand acceleration or how to solve many of the chapter review problems.

Sally read the first assigned problem which stated: Solve the equation: $v_f = v_i + at$, for acceleration. She manipulated the formula by using her algebra skills and determined that $a = \left(\frac{v_f - v_i}{t} \right)$. Yet Sally did not know what this solution meant. She did not understand that acceleration was the change in velocity for a given time interval and that velocity was a change in displacement for a given time interval. Solving this problem enabled her to manipulate mathematical equations yet she couldn't link the formula to an understanding of acceleration.

Sally wanted to ask someone what her solution meant before proceeding to the next question. Frank sat across from Sally at the same student work table, yet she did not want to ask him for help again. She noticed that he was busy solving the assigned physics problems, and she didn't want to interrupt him.

After attempting about half of the assigned problems, Sally began to daydream. She often daydreamed during the physics period. In this physics course with little direct instruction or structured whole group activities, Sally found ample time for daydreaming. At one moment she might imagine herself shopping at her favorite mall with her best friend Edith. Traveling to the mall with Edith was a favorite after-school activity. In another instant, Sally pictured herself cruising around town in her new Plymouth Neon. It was definitely cool the way the metallic green car sparkled in the late afternoon sunlight. Sometimes, she saw herself running drills at

soccer practice or kicking a winning goal in a soccer match. She enjoyed soccer and would probably continue playing this sport after graduating from high school.

Forty-five minutes into the period, Alice came over to Sally's table and sat down. Alice and Sally often socialized during class. They had been attending the same school system for many years. They had enrolled in many of the same classes at Trackview High School. Yet outside of school, Sally and Alice did not spend time together. Sally did not consider Alice as one of her friends. Yet, since she was the only other girl in the physics class, Sally socialized more with her than any other person in the room. This socialization was a way for her to pass the time. She could talk to Alice about things like clothing, make up, jewelry, hairstyles, and shopping.

With an hour remaining in the period, Alice walked back to her desk and Sally reached into her book bag and withdrew her purse. She pulled out a plastic compact from her purse. While looking into the mirror she examined her shoulder length brunette hair and toyed with her silver hoop ear rings. After closing the compact and returning it to her purse, she took out a brown hair brush and brushed her hair. Sally held the brush in her right hand and used her left hand to pat her hair down after the brush passed through it. Even though she was satisfied with the look of her hair, she continued combing it. Fussing with her hair and make-up was not only to ensure she looked presentable; it was a way to alleviate boredom. Sally took out her compact and hair brush nearly every day in the physics class.

Just as Sally was putting the hair brush in her purse, Mr. Benson walked into the room from his office and announced, "OK! Sally do Number 1 from the homework assignment on the front chalkboard, Frank do Number 2, Alice do Number 3." Mr. Benson continued assigning problems until each of the ten physics students had a problem to solve.

Sally dreaded going up to the chalkboard, because she did not know how to solve her assigned problem. The familiar wave of fear came over her as she thought that Mr. Benson might discover her inability to solve the problem.

Although Sally did not understand how to do the problem, she rose out of her chair, walked to the front of the classroom, and picked up a piece of chalk. She flipped through the pages of her textbook to find the assigned problem. Sally wanted to show Mr. Benson that she had at least attempted the problem.

Standing at the chalkboard with her textbook open, she read the problem slowly. It asked her to determine how long it would take for a stone to strike a river after being dropped from a height of 20 meters. Sally did not have the slightest idea of how to solve this mechanics problem. Furthermore, she did not know that the rate of acceleration due to gravity was 9.8 $\frac{m}{s^2}$ near the earth's surface nor did she know what the unit $\frac{m}{s^2}$ represented. The best she could do was give

the impression that she had attempted the problem and had some basic understanding of it. She began to slowly sketch a diagram of a person holding a rock while standing on a bridge above a river.

While Sally stood at the front of the room staring at her sketch, a few of the other students finished their problems and returned to their seats. Yet Sally remained at the board, not quite sure of what to do. At this time, the teacher stepped outside the room to speak with the assistant principal.

Jim, a straight 'A' student, who had helped her solve physics problems before, asked Sally if she needed help on her problem. Sally replied that she had no idea of how to solve the problem. Sally appreciated his assistance, yet she felt guilty that she might be taking him away from his own work. However, Jim had already finished his problem on the chalkboard, so she thankfully accepted his offer to help.

As Jim worked on her homework problem at the front of the room, it became clear to Sally that all she really cared about in this class was her grade. That letter on her report card was what people really cared about. The school counselors, college admissions officers, and her parents stressed the importance of earning good grades.

At the chalkboard, Jim was beginning to explain how to solve the problem to Sally. He wrote the formula: $y = v_y t + \frac{1}{2} g t^2$. He took time to listen to Sally's questions when she asked what 'g' represented. Jim explained that 'g' was a type of acceleration. It was the acceleration due to gravity and for this problem the accepted value was 9.8 $\frac{m}{s^2}$. Sally knew that objects sped up when falling through the air, but she didn't understand how the equation represented the motion of the falling rock. Although Sally did not understand, she listened attentively.

Next, Jim listed the values of the other variables on the chalkboard. Jim wrote: (y = 20 meters), (V_y = 0), and (t=?). He performed some algebraic manipulations on the original equation and derived the equation: $t = \left(\frac{2y}{g}\right)^{\frac{1}{2}}$. Sally understood how he obtained the new equation from the original equation, but she still wasn't sure what the variables represented. Then Jim substituted the values for 'y' and 'g' into the equation, and he obtained an answer of "2 seconds" (rounded off to one significant digit).

Just as Jim wrote the solution on the chalkboard, Mr. Benson returned to the room, and he called the class to order. Sally and Jim walked back to their seats. Mr. Benson began to review the problems from the chalkboard before the entire class. By this time, 35 minutes remained in the period.

One by one, Mr. Benson read the questions for the assigned problems. He stated which formula was used to solve each problem and questioned the students if an error was evident.

Sally's heart began to race as Mr. Benson started with her problem. She sat back in her chair with arms folded and she hoped that he wouldn't ask her to explain her answer. Then, Mr. Benson quickly read her solution and stated it was correct. Sally's fear calmed.

Mr. Benson reminded students that the proper units must be included with the numeric answer for each solution. During the 10 minutes that Mr. Benson reviewed the chalkboard problems, Sally and a number of other students, copied down many of the board solutions onto their notebook papers.

After finishing the review of the board problems, Mr. Benson wrote down the next homework assignment on the front left side of the chalkboard. He stated that this new assignment consisted of 18 problems on projectile motion in two dimensions. The assignment would be due at the beginning of the next day's class period. Sally heard him say this as she glanced at the clock and noticed that less than twenty minutes remained in the class period. She did not feel like getting started on the new assignment at this time. Rather, she picked up her now completed homework from the day before and placed it in the red plastic tub marked "In Basket" next to the aquarium at the front of the room.

Sally walked back to her desk and put her book, notebook, and purse into her book bag. She sat down to wait for the period to end. Another class had passed and her fear that Mr. Benson might discover her lack of understanding of mechanics faded with the electric humming of the classroom clock. Her thoughts turned elsewhere as she watched the thin red second hand sweep the white dial.

Interpretations

Physics classroom communities are places where not only an understanding of the contents and processes of science are to be acquired by students, but they are also places where students are to become contributing members of moral classroom communities (Thomas, 1990). According to Thomas (1990), "[e]lementary and secondary schools . . . have a compelling obligation to understand themselves as moral learning communities" (p. 292). The classroom community is a society unto itself which has norms of conduct based on standards maintained by teachers, administrators, parents, and the broader community in which schools are situated. For the purpose of this paper, a community is defined as "a number of people held together because they are working along common lines, in a common spirit, and with reference to common aims" (Dewey, 1902, p. 14). Classrooms are moral communities which contain individuals with diverse aims. The teacher's aim is to guide student learning and to assess student understanding of the subject content, and it is the students' aim to learn the subject content and to earn good grades.

Within the physics classroom community from which the student stories evolve, the students and their teacher exhibit a broad range of actions. For example, students: read textbooks, write notes, press calculator keys, speak with others, look out classroom windows, sleep, and a host of other observable behaviors. These actions have moral implications which may be interpreted in the context of the goals of students as well as the goals of teachers. Teachers represent the school and the larger community which certifies and sanctions their role in classrooms. They take attendance, write assignments on the chalkboard, talk to students, collect papers, and determine the value of what students do by assigning a grades. The actions of teachers and students have moral implications based on what students and teachers expect of themselves and each other in the classroom.

Honesty

In the story *Classroom Dilemma*, Sally must decide whether to accept or not accept the value of a constant that is needed to answer a test question. Sally does not have the value of 'G' on her equation card, so she decides to copy the value and use it to solve a test question. She has a slight sense of remorse for using the value of 'G'; her guilt results from a belief that it is not proper to accept help during a test.

Power (1993) notes that "cheating is a pervasive problem particularly in high schools with a high percentage of students going on to college" (pp. 152-153). Sally's classroom cheating seems to support Power's assertion since she and the other physics students are college bound seniors. Sally believes that a poor test grade may impair her overall grade in physics and that will lower her college admission ranking. At the beginning of the school term, Sally's goal to earn a good grade was equally important as her goal to learn physics. However, as the trimester progressed, she became more interested in earning a good grade regardless of the level of her understanding of the physics concepts.

In understanding how classroom cheating occurs in the high school classroom; Power notes that, "most students, even the honest ones whose self-interest lies in thwarting cheating, will allow others to copy their answers, overlook their peer's infractions, and, of course, never even consider reporting a peer to the teacher" (1993, p. 153). Sally would agree with the following Power example:

> One student put it this way: 'At high school, the teachers assume you are going to cheat. The teacher says not to cheat and it is almost like inviting it. It is always a challenge, let's see if we can beat this teacher.' (1993, p. 153)

Sally engages in a cat-and-mouse game with the teacher just to see if she is clever enough to cheat without getting caught. Thus cheating is not simply an ethical question of honesty in the physics classroom. Rather it is an issue of the power relationships between Sally and Mr.

Benson. Sally does not accept the teacher's ethical code that bans cheating on tests and assignments. For her, rebelling against the wishes of the teacher is a way to gain power and prove to herself that she is smart.

Competitive classroom environments emphasizing standardized assessments may inadvertently promote student cheating. Sally is not the only student who receives outside help during tests. Other students occasionally copy test answers from one another. Noddings (1992) proposes that competitive grading, as evident in standardized testing, relates to a host of student actions which constrain individual growth and the growth of democratic classroom communities.

Another interpretation of Sally's cheating is that she is at the conventional stage of moral development as proposed by Kohlberg (1981). [It needs to be noted that Kohlberg's stages of moral development have been criticized by feminists (see Gilligan, 1992) who claim that these stages fail to account for the life experiences of girls.] According to Kohlberg's moral framework, Sally has a conflict with the institutions and laws governing cheating in the classroom. She is torn between wanting to abide by the classroom rules and living up to the expectations of others. The policy handbook at Trackview High School, which Mr. Benson affirms with his own classroom rules, states that students caught cheating will receive "no credit for the assignment and the parents will be notified" (Trackview Handbook, 1994). Since Sally wants both to improve her chances at being admitted to college and to please her parents with a good grade in physics, she decides that using the value of 'G' is justified since she will not be caught.

Mr. Benson has not informed students which formulae and constants to list on their equation cards. Since the test covers three lengthy textbook chapters filled with many equations and constants, it is problematic to copy all of the necessary information onto one 3 x 5 inch index card. Sally's believes that the teacher has not adequately prepared her for the test. This belief reinforces her action to accept the value of 'G' during the test.

In the second story, *Fear Of Being Revealed,* Sally looks to other students for help in solving textbook problems. Mr. Benson allows students to work together in small groups to solve problems; therefore, Sally does not consider it unethical to ask for help. However, the physics students are not instructed in formal cooperative learning strategies where each person takes on a specific role in group problem solving as suggested by Johnson and Johnson (1987). What results is a form of unstructured group learning of the kind that enables Sally to become dependent on other students, primarily Frank and Jim, to solve the textbook questions and problems for her.

Sally is tutored by Jim to the point where she feels a sense of guilt about asking for too much help. According to Sally, it is not deceitful to ask for and receive help in solving problems as long as she does not keep other students from completing their own assignments. Her sense of

ethics is woven into a concern that she may be interfering with the learning of the other students.

The issue of not wanting to interrupt other students' learning occurs when Sally accepts Jim's help in solving the free fall problem. Sally intends to make it appear that she has some knowledge of how to solve her assigned textbook problem at the chalkboard. She stalls for time by drawing an elaborate diagram to illustrate the problem, but she does not know how to connect the concepts to the formulae to obtain an answer. Jim offers to help her just as Mr. Benson steps out of the room. When Sally realizes that Jim is finished with his own problem, she accepts his help.

When the chalkboard problems are reviewed by Mr. Benson, Sally acknowledges Jim's work as her own. Sally is being dishonest since she does not know how to solve the problem, yet she is recognized by the teacher for completing it. Sally's dishonesty protects Jim and conceals her own lack of understanding. Sally does not want to risk getting Jim into trouble with Mr. Benson, and she would rather not make an issue of explaining that she still does not understand how to solve the now completed problem.

Caring

According to Sockett (1993), students and teachers ought to enter into caring relationships to facilitate a moral education. Informed by the works of Noddings (1984, 1988), Sockett maintains that caring is a moral ethic fundamental to professional educational environments. Sockett warns that "maybe our caring in schools becomes too routinized, too official (see the counselor!), and too detached from the problem of being a person, as opposed to having a problem to solve" (p. 78).

To facilitate the caring ethic, it is important for teachers to enter into dialogues where the teacher takes on the role of the one who cares for others (Noddings, 1984). "The one-caring is engrossed in the cared-for and experiences a motivational displacement toward the projects of the cared-for" (Noddings, 1984, p. 176). However, an ethic of care may be difficult to establish with students in secondary school environments. Sockett (1993) claims that:

> Dialogue between students and teachers seems inhibited by the pressure of test-driven curricula, and opportunities for caring cooperation can scarcely be achieved in competitive frameworks. High school climates then become antithetical to caring, for student motives are routinely suspect. (p. 79)

Regarding students caught cheating, Noddings notes that a caring ethic ought to be evident through the teacher's compassion for the student's actions. This is not to suggest that teachers should allow cheating. Rather the teacher who suspects cheating might say to the student, "I know you want to do well, or, I know you want to help your friend" (Noddings, 1984, p. 178).

This kind of language attributes the best possible motive to the student's action. The teacher in this situation may continue by stating the reasons why cheating is not permitted in the classroom in an effort to help the student internalize the rules regarding cheating.

Sally rarely, if ever, speaks with Mr. Benson. She believes that the teacher does not properly prepare her to answer test and homework problems. She concludes that the teacher does not really care whether she learns or not.

Sally's views about not wanting to ask for help is interpreted as a gender related issue which evolves from an ethic of care (Noddings, 1984). She expresses empathy for Frank and Jim who are willing to help her. By questioning her own assistance seeking, Sally "rejects the form of rationality which treats human beings as merely means" (Giroux, 1988, p. 98). She senses a responsibility as the "one-caring" as she is "cared-for" by other students (Noddings, 1992). However simply viewing Sally as the "one-caring" and the "cared-for" may not provide a complete interpretation of her actions since other issues of relationship and justice need to be considered.

Strike (1990) criticizes the ethic of care as advanced by Noddings (1984) since it "represents an incomplete vision of the goods of relationship and is neglectful of the goods of accomplishment" (p. 216). Sally seeks to foster and maintain friendships with Frank and Jim based on her perception of "what duties she owes to them regardless of her relationship to them" (Strike, 1990). From this perspective, Sally's actions are viewed less from an ethic of care and more from an issue of justice. Strike notes, "justice is of concern in human relationships when people are in competition for resources and when benevolence cannot be taken for granted" (1990, p. 218). In the physics classroom, time and prior knowledge of mathematics are limiting resources. Sally understands that Frank and Jim have attained a higher level of mathematics proficiency due to their prior coursework, and she doesn't want to take advantage of them.

Noddings provides an alternative perspective in *Ethics for Professionals in Education* (1993). Based on an ethic of care, one does not assume "that all students should be treated by some impartial standard of fairness. Some students need much more attention than others, and some will respond to one teacher's attention whereas others may need a different teacher's care" (1993, p. 49). Treating the students in an equal manner does not mean equitable treatment. For example, Sally needs a larger amount of individual instruction in how to solve problems where she can ask questions of the teacher.

Implications

Tobin and McRobbie (in press) report that the actions and interactions of high school teachers and students in a government school in Australia were constrained by the misconception that a science curriculum needs to prepare students to successfully answer test questions. Similar to the Tobin and McRobbie study, this paper shows that "learning facts and algorithms to obtain correct answers to given exercises" is also a central concern of secondary physics learners in the USA.

The cultural myth of having to prepare students for examinations is assumed by many teachers and students. Obtaining high grades becomes the dominant goal for many students--a goal that is endorsed by teachers, guidance counselors, college admission officers, and parents. This goal may become more significant than learning the science content and processes. Students of physics may justify cheating as a means of attaining their goal of achieving good grades.

To suggest that student cheating is an immoral act is to ignore the sociocultural context in which students and teachers act and interact. High school students, especially those seeking good grades, may cheat in some science classroom settings if they are not properly prepared to answer test items. Students may copy test items, then they may copy answers, formulae, and other information from other students and conceal their actions from the teacher. This concealment may generate a sense of guilt within some students who believe that copying is wrong. In the context of a classroom setting where the teacher is not open to questioning and does not adequately prepare students, the moral issue is not simply the action of the student during the test but the actions of the teacher prior to the test.

Both the teacher and the students need to reach out to one another to minimize classroom cheating. Since the teacher has the responsibility to assess learning and assign grades, it is his/her responsibility to foster a classroom climate where students feel comfortable to speak openly about their understanding of the subject matter. It rests with each member of the classroom community to create congenial learning environments, but it remains for teacher to create classroom rules and procedures which foster the development of the voices of students.

Assigning grades creates competitive learning environments where students struggle to earn top marks regardless of the degree to which they engage in the subject content and processes. Grades may also motivate some students to work hard and engage in serious thought about the subject matter. In democratic classroom communities, competitive grading structures may motivate some secondary learners to excel at memorizing information needed to successfully complete standardized examinations. Yet in Sally's case, it wasn't simply a matter of her desire to earn good grades, but it was also a matter of her perception that she had not received adequate instruction.

Caring is an essential component of productive science learning environments. Secondary science teachers need to model caring in their classrooms for students to have a sense that the

teacher has a concern for them and their learning. Students and teachers need to take on both the "one-caring" and the "cared-for" roles to facilitate student learning.

Conclusions

A combination of "consequentialist" and "nonconsequentialist" reasoning is linked to Sally's copying of both the value of 'G' during the test and the solutions to the homework problems from the front chalkboard. Sally is a "consequentialist" who believes in maximizing the consequences of her actions (Strike & Soltis, 1992). When she uses the value of 'G' on the test as described in *Classroom Dilemma*, she believes her action is not honest; however, since all of the students in the classroom hear the value of 'G', she does not believe that she is gaining an unfair advantage over them. Her ethic of honesty is associated with fairness for others, in this case the other students in the classroom. Alternatively, Sally is a "nonconsequentialist" (Strike & Soltis, 1992) who believes in a universal good. Sally believes it is the teacher's responsibility to adequately prepare students for tests. Since the teacher fails to explain which formulae are important for the test and the teacher does not adequately communicate the meanings of the physics concepts, Sally believes that copying the value of 'G' is justified.

Sally wants to be sneaky in the physics classroom and not get caught. As a high school adolescent, she enjoys being sneaky. She convinces herself that cheating and not getting caught will prove that she is smart. It is fun to out-whit the teacher. Sally is not sneaky to impress her peers, rather she wants to amuse herself. She also wishes to gain power in the classroom by breaking the teacher's classroom rules. In her mind, cheating adds excitement to an otherwise boring classroom environment.

Sally is a caring person who's ethics have been distorted by the reporting of grades. Her ethic of care takes precedence over her ethic of honesty. She wants to meet the expectations of her parents and others who have convinced her that good grades are essential for her future. However, she does not have the prior knowledge of mathematics and science to learn physics by reading the textbook and solving problems independently. Sally cheats in Mr. Benson's classroom to obtain good grades and thereby please her parents because she cares for them.

To understand the ethical issues associated with cheating, it is helpful to consider the outcomes of the educational process. Learning, of course, is the prime educational goal according to the adults who create, control, and operate the educational system, yet from the perspectives of students, grades are more important than learning. And grades do not always correlate positively with learning and understanding of the subject matter. Students, even those with a strong caring ethic like Sally, may justify cheating in the context of their science classrooms. Ultimately, cheating becomes less of an issue of honesty and more as a means to promote oneself

through an educational system that values grades and grade point averages over learning and understanding physics.

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